Paper No. 12

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JIH-CHURNG TWU, SYUN-MING JANG, and CHEN-HUA YU

Appeal No. 2002-0102
Application No. 09/298,879

ON BRIEF

Before KIMLIN, LIEBERMAN, and POTEATE, Administrative Patent Judges.

POTEATE, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the examiner's refusal to allow claims 1-8, 10-15 and 18-22, which are all of the claims pending in the application.

Claim 1 is representative of the subject matter on appeal and is reproduced below:

1. The method of simultaneously forming both a high voltage and a low voltage transistor in the manufacture of an integrated circuit comprising:

providing a semiconductor substrate wherein active areas of said substrate are isolated from other active areas and wherein there is at least one low voltage area in which said low voltage transistor will be formed and at least one high voltage area in

which said high voltage transistor will be formed wherein said high voltage transistor as a voltage higher than said low voltage transistor;

first wet oxidizing the surface of said semiconductor substrate to form a first layer of gate oxide on the surface of said semiconductor substrate in said active areas;

covering said low voltage active area with a mask;

second wet oxidizing the surface of said semiconductor substrate where it is not covered by said mask to form a second layer of gate oxide underlying said first gate oxide layer in said high voltage active area wherein said second wet oxidizing comprises H_2 and O_2 in a N_2 atmosphere in the ratio of H_2 : O_2 : N_2 of 1 : 2 : more than 20;

thereafter removing said mask;

depositing a layer of polysilicon overlying said first gate oxide layer in said low voltage active area and overlying said first and second gate oxide layers in said high voltage active area; and

patterning said polysilicon layer to form gate electrodes for said low voltage and said high voltage transistors in the fabrication of said integrated circuit.

The references relied upon by the examiner are:

Pong et al. (Pong)	5,210,056	May 11, 1993
Lin	5,502,009	Mar. 26, 1996
Sun et al. (Sun)	5,920,779	Jul. 6, 1999
El-Diwany	5,953,599	Sep. 14, 1999

Grounds of Rejection

1. Claims 1-5, 8, 11-14 and 18-22 stand rejected under 35 U.S.C. § 103 as unpatentable over El-Diwany and Lin and further in view of Pong.

2. Claims 6, 7, 10 and 15 stand rejected under 35 U.S.C. § 103 as unpatentable over El-Diwany in view of Lin and Sun and further in view of Pong.

We reverse.

Background

The invention relates to a method of simultaneously forming both a high voltage and a low voltage transistor in the manufacture of an integrated circuit. Claims 1, 10 and 18. The method involves a two-step wet oxidation using H_2, O_2 and N_2 in specified ratios. ***Id.*** The claims require that the second gate oxide layer underlies the first gate oxide layer. ***Id.*** According to appellants,

> [t]he significance of forming the second gate oxide under the first gate oxide is that the substrate in this area is not damaged by the process of removing the first gate oxide and then regrowing a second gate oxide. The substrate is protected by the first gate oxide, thus maintaining high quality.

Appeal brief, Paper No. 10, received April 23, 2001, page 8.

Discussion

The initial burden of presenting a ***prima facie*** case of obviousness rest on the examiner. ***In re Oetiker***, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). Where an obviousness determination is based on a combination of prior art

references, there must be some "teaching, suggestion or incentive supporting the combination." ***In re Geiger***, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987). "The factual inquiry whether to combine references must be thorough and searching." ***McGinley v. Franklin Sports, Inc.***, 262 F.3d 1339, 1351-52, 60 USPQ2d 1001, 1008 (Fed. Cir. 2001).

In rendering a decision on appeal, the Board must ensure that the requisite findings are made based on the evidence of record. ***See In re Lee***, 277 F.3d 1338, 1342, 61 USPQ2d 1430, 1432 (Fed. Cir. 2002). The Board must set forth its findings and the grounds thereof *as supported by the agency record* and explain its application of the law to the facts. ***Id***. the Board's decision must be supported by substantial evidence. ***In re Zurko***, 258 F.3d 1379, 1381, 59 USPQ2d 1693, 1694 (Fed. Cir. 2001).

For the reasons discussed below, we find that the examiner has failed to meet his burden of establishing a ***prima facie*** case of obviousness. In particular, the examiner has failed to make the requisite findings of fact and we are constrained to reverse the examiner's final rejection of the claims.

As noted above in the background section, each of independent claims 1, 10 and 18 requires that during the second

wet oxidizing step, the second layer of gate oxide be formed underlying the first gate oxide layer. In their arguments on appeal, appellants repeatedly assert that none of the cited references disclose or suggest forming the second gate oxide underlying the first gate oxide. See, e.g., appeal brief, pages 8-12. Our discussion regarding the step of forming the second oxide layer under the first oxide layer is provided on pages 9-10 and 11 in connection with figures 3-4 and 6-7.

The examiner concedes that El-Diwany does not specifically teach a second wet oxidizing step to form a second gate oxide underlying the first gate oxide layer. See examiner's answer, Paper No. 11, mailed July 5, 2001, page 3, penultimate paragraph. The examiner relies on Lin as disclosing a second wet oxidation step. See ***Id.***, page 4. However, the examiner does not identify in Lin or any of the other references, a specific teaching as to forming the second gate oxidation layer under the first layer. Rather, the examiner's response to appellants' argument that such a step is not taught or suggested by the cited references by stating that,

> [f]urther it is a well known fact that any time oxidation step is under taken a portion of the oxide grows below the surface of the existing layer (generally about 40%) and the rest grows above thus at

> least about 40% of the second oxide layer 146 is grown below (underlying) the layer 134.

Examiner's answer, page 8 (referencing figures 1C and D of El-Diwany).

However, the examiner's mere assertion that it is well known that a portion of oxide grows below the surface of an existing layer is simply insufficient to establish a ***prima facie*** case of obviousness. The Federal Circuit has held that it is impermissible for the Board to reach conclusions based on what the examiner believes to be basic knowledge or common sense. ***In re Zurko***, 258 F.3d 1379, 1386, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). Rather, it is necessary for the examiner to identify concrete evidence in the record in support of its findings, see ***Id.***, such that the Board may examine the relevant data and articulate a thorough explanation for its decision. ***See In re Lee***, 277 F.3d 1338, 1344, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002).

Accordingly, the rejections of the claims under 35 U.S.C. § 103 are reversed.

REVERSED

EDWARD C. KIMLIN Administrative Patent Judge	)	
PAUL LIEBERMAN Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
LINDA R. POTEATE Administrative Patent Judge	)	

LRP/lbg

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